OIB
Antarctic Flight 10, Weddell Sea Ice #1

Aircraft	DC-8
Flight Number	DC8-100118
Flt Req #	108002
Flight Hours	11.0
Date	10/30/09
Purpose of Flight	ICE Bridge-Weddell Sea Ice #1
Aircraft Status	Airworthy
Sensor Status	All installed sensors operational.
Significant Issues	None
Accomplishments	This completes two of the planned Weddell ATM sea ice surveys. Conducted low level transects Northwest to Southeast along the Antarctic Peninsula in the western Weddell Sea turning to parallel the Weddell Ice Shelf before returning on a line just west of the previous Weddell mission. Visibility was poor at times and data collection slightly hampered (~10% missed) but overall was described as productive. Other related low altitude instrumentation were operational. Altitudes during transects varied between 600 ft and 1500 ft.
Planned events	Low altitude Peninsula for 31 Oct. flight.

Flight Summary

Sea Ice-3 (Weddell Sea, Peninsula tip to Ronne Ice Shelf), FLT 10

Friday, October 30, 2009

Seelye Martin (Mission Principal Investigator):

Weather Summary: an easy call. AMPS forecast showed low in western Weddell, while flight services reported weak high pressure in eastern Weddell over our area of operations, and high clouds at beginning of flight. This is about as good as we can get. Note that because of open water in leads, we will probably have scattered fog throughout the flight. So this is an easy call. Because we had snow in Punta Arenas last night, wings need to be de-iced. This involved spraying ethylene glycol on wings. During the spraying, the air intakes for the trace gas experiment were bagged. This delayed our take-off by 30 minutes, and because of the restrictions on crew duty hours, may reduce our time on station in the Weddell.

Mission Description: Our plan is to sample the eastern and middle section of the Weddell, in two long traverses, extending from the ice edge to the Ronne and return. This will allow us to sample the thick multi-year mix of ice adjacent to the coast and the thinner ice in the central Weddell. Again, this will be a first time measurement for this area.

Time line of flight:

0933: Take-off, head to cruise altitude.

0955: problem with aircraft electrical power, lost power at my station. Crew needs to reroute power, to bring back power to a number of stations.

1010: I have my power and navigation back.

1109: starting our descent close to King George Island, avoiding tip of Peninsula, headed for D'Urville Island

1115: 18,000 ft.

1123: turning onto sea ice line 1, altitude 4,800 ft. Sea ice in view. John plans to fly the plane down the line on SOXCDI.

1126: clearing the island, then we are due to cross the west tip of Joinsville Island, then the east side of Anderson Island.

1132: staying at 4,000 ft to avoid islands, rockeries.

11:34, clearing Anderson, Seymour Island lies straight ahead, to aircraft right, but looks like we will clear. Cloudy and foggy.

1135: cleared Anderson. At 3,200 ft, looks like cloud deck below.

1137: dropping to 2,500 ft, now we are going to 2,000 ft, going through cloud deck, mild turbulence. Quick view of sea ice through hole in cloud, half-way to Seymour Island.

1140: altitude 2,200 ft. Staying parallel with top of cloud deck, views of sea ice flashing in and out. Report from cockpit reports open water ahead, staying high until we clear Seymour.

1143: clearing Seymour, descending again,

1145: now at 1,500 ft, sea ice is visible through patchy fog.

1146: 1,400 ft. ATM and Snow Radar are taking data, sea ice is clearly visible.

1203: we have a horizon and an iceberg in distance; in fact I can see blue sky above. The SOXCDI is giving a very smooth ride, and we are staying at altitude. This makes it easy for Ben at the snow radar to keep his instrument operating. Previous flight, we were constantly changing altitude to get under the fog. Air temp is -15 C, IR surface temp is -8 C. winds are 10 kts from 030. So far, this is a beautiful run.

1207: some sunlight on the ice, we must be flying into that small high-pressure system off the Peninsula.

1223: about 1/3 the way down the line. Beautiful flying conditions, horizon visible all around.

1246: conditions continue to improve; we are at a close approach to the Antarctic off Larsen C.

1258: we are in a diffuse very thin cloud deck, but lasers are still seeing the surface. Wind speed is 10 kts from 310, so we may have transited the high. Air temp is -16 C. Clouds are getting thicker.

1305: dropped to 1,380 ft, socked in below to surface. Wind is 8 kts. Air temp is -16 C; cloud bank extends to horizon all around.

1307: dropping down to 700 ft. turbulent in cloud.

1310: at 700 ft, can't see a thing, heading back to 1500 ft.

1312: lost surface totally about 8 minutes ago.

1317: will re-evaluate in 20 min, it is 50 min to the turning point at the shelf.

1337: At pilot's suggestion, we flew up to 10,000 ft, took a look around, some evidence of sea ice surface visible up ahead. Are returning to the deck, passing through 3,800 ft.

1340: Ben has surface on radar, Jim had momentary laser contact. DMS is seeing leads through the fog.

1341: descend to 700 ft.

1342: solid laser signal at 1,200 ft. Transition to clear surface, John sees blue sky ahead, 1,160 radar altitude. No horizon. The Weddell is a beast to fly in. Clear skies again, John says we lost between 300 and 350 km of track, total track going down is 1,300 km, so about a 25% loss.

1355: Clear skies, Peninsula visible to aircraft right, beautiful conditions. Coming up on waypoint to turn parallel to the Ronne Ice Shelf. Navigation system SOXCDI is working really well. 8 min to turning point. Ice is very thickly packed down here. 4 min out, Peninsula is still visible. Coming in under a deck of high clouds. We will parallel the Ronne down to the Filchner, then head back.

1406: made our turn, closest encounter to the Ronne.

1431: Weather remains beautiful, clear skies.

1456: maneuvered onto second long line. Some high stratus, wind is 18 kts. Except for our moment of total panic about the ice fog, this has been a beautiful flight.

1555: still clear, approaching Larsen-C going north.

1604: Sporadic clouds have returned just above our flight level.

1607: fog is back, drop 200’ to get under ceiling, to 1,400 ft.

1611: We just passed the 4 hrs to go to PA. Fog is coming back.

1615: Cleared up again, back to 1,500 ft, which is optimal for the snow radar. Wind speed is 10 knots. 535 nm to next waypoint.

1620: parallel with Larsen C.

1633: Weather looks good to the horizon.

1630: 2 hrs out of waypoint, at end of line, then slightly less than 2 hrs to PA.

Pilot suggests that regions of fog are correlated with pressure troughs, we can look into this.

1653: 87 minutes out.

1748: Into haze, nearing ice edge, 34 minutes out, 143 nm.

1750: Ground fog increasing, dropped to 840 ft.

1758: Still can see the surface. Air temp -13 C.

1805: Fog persists, snow radar operation may be marginal.

1809: Looks like the sea ice is in region were ocean swell penetrates into the ice; floes are broken into small pieces (~10 m across).

1813: Definitely in the marginal ice zone, lots of open water, floes look rotten, air temp -12 C, 9 minutes to waypoint. Because of fog, marginal ice zone is a tough place to work. Lots of open water, looks like we are at ice edge.

1823: at waypoint, heading for high altitude and home, nadir camera shows what sure looks like open water, with occasional ice edge bands. Classic off-ice wind situation. End of line, let's go home. 3,500 km of track flown, lost about 350 km, so lost about 10% of observations due to fog band.

1941: 28 min out, will only do low-level laser calibration.

2019: laser ramp pass

2026: landed. Flight duration: 10 hr 53 minutes.

Individual instrument reports:

ATM: Following a short delay due to de-icing of the DC8 wing surfaces (due to a predawn light snowfall), mission #10 to map sea ice in the Wendell Sea took off. Some light fog was encountered early on the long southbound (301 to 302) line, followed by clear conditions. A very thick patch of ice fog was encountered for about 45 minutes in the last portion of the southbound leg (around 70 S). We climbed to 10,000 feet and noted clearing conditions ahead, and flew into clear skies again for the southern short leg. The clear skies continued with only short infrequent patches of light ice fog on the northbound leg (303 to 304) until 64 S when we flew at 600' to get under a cloud layer/ice fog to the end of the line.

Except for gaps due to fog and low clouds, the ATM, navigation and Cambot systems all functioned well today.

DMS: The DMS again obtained imagery with 10 cm resolution and approximately 70% forward overlap over the entire ATM flight tracks, except during the period on the southbound leg where low clouds obscured the scene. Approximately 19,000 images were recorded over pack ice of varying properties. In general, at ATM flight altitudes, the footprint of individual images is nominally 500 meters along-track and 300 meters across-track. Of significant importance is the fact that the number of images acquired exactly matched the number of Applanix "Events" recorded, providing additional evidence of the stability of the DMS system. Images had best contrast when the sun was out.

Snow and Ku-Band Radars: There is a world of difference between the Greenland and Antarctica sea ice flights. The required aircraft altitude variations due to fog and cloud cover makes one sit at the edge of their seat for the entire flight line. No rest for the weary. Regardless, over 95% of the flight line was recorded by the Snow Radar amounting to 15 waveform variations and 350 GB of raw data. Software difficulties delayed data recording on the Ku-band Radar, but over 400 GB of raw data was recorded for 5 waveform variations. Every +/-10 us change in waveform pulse length corresponds to a +/-1-dB change in pulse compression gain. For lower altitudes, say 600 ft, our minimum for today, the pulse length needs to be shortened considerably to maintain a reasonable beat frequency in the 10's of MHz. The converse is also true for higher altitudes. It was the last sea ice flight line of the 2009 OIB Antarctica campaign, but both radars will continue to record data for every low-altitude mission.

POS/AV: No problems with either system, with the only anxious time being when the converter that supplied power for the data station (the 510 system is now plugged into an UPS) & L-VIS failed. The mission managers did a good job of switching power to other converters before the UPS's depleted their batteries, so neither POS-AV system lost power.

MCoRDS: not operating today.

LVIS: not operating today.

Gravimeter: worked properly.

Jim Yungel (ATM Team):

Following a short delay due to de-icing of the DC8 wing surfaces (due to a predawn light snowfall), mission #10 to map sea ice in the Wendell Sea took off. Some light fog was encountered early on the long southbound (301 to 302) line, followed by clear conditions. A very thick patch of icefog was encountered for about 45 minutes in the last portion of the southbound leg (around -70) We climbed to 10,000 feet and noted clearing conditions ahead, and flew into clear skies again for the southern short leg. The clear skies continued with only short infrequent patches of light ice fog on the northbound leg (303 to 304) until 64 S when we flew at 600' to get under a cloud layer/ice fog to the end of the line. The ATMs GSP, NAV and Cambot systems all functioned well today.

Only the KU and Snow radars operated today and collected good data. A ramp pass at 1200' was flown over the cal ramp. Some pictures of the de-icing procedures and of Punta Arenas city on climb out to Antarctica, and a few sea ice shots. The last image indistinctly shows a couple of seals on the snow covered ice.

Punta Arenas